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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/787,161

02/27/2004

Robert Alan Cochran

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HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER

VERBRUGGE, KEVIN

ART UNIT

PAPER NUMBER

2189

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/787,161	Applicant(s) COCHRAN ET AL.	
	Examiner Kevin Verbrugge	Art Unit 2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claim 35 has been renumbered as 34, therefore claims 1-34 are pending. Future claim listings should have original claim 35 listed as claim 34.

35 U.S.C. 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 29 recites the limitation "the quaternary storage node" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 6, 14-16, 20, and 24-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) of the specification in view of U.S. Patent 6,820,180 to McBrearty et al.

Regarding claims 1, 16, 27, 28, 29, 30, 31, and 33, McBrearty shows the claimed daisy-chained device mirroring architecture in Fig. 5, for example.

He shows storage node N (physical storage system (PSS) 2) configured to mirror data on node N-1 (PSS-1).

He shows storage node N+1 (PSS-3) as mirroring the data on node N (PSS-2).

He shows storage node N+2 (PSS-4) as mirroring the data on node N+1 (PSS-3).

Clearly nodes N and N+1 are operable to forward downstream writes to N+1 and N+2, respectively, since McBrearty teaches that "A first mirror [PSS-3] of the three mirrors is set to synchronize to a second mirror [PSS-2] and a third mirror [PSS-4] is set to synchronize to the first mirror [PSS-3]. The first and the third mirror are backup mirrors and the second mirror is a working mirror. One of the backup mirrors is located remotely and the other locally." (see abstract and column 2, lines 40-48).

McBrearty does not teach that node N (PSS-2) is operable to track acknowledgements as claimed. Rather he teaches a system of modification tables (see

Figs. 6-8) which are a type of bitmap to keep track of what changes have been made to the data since the last synchronization. These tables are then used to resynchronize nodes N+1 (PSS-3) and N+2 (PSS-4) with node N (PSS-2). (see column 6, lines 49-59).

In the admitted prior art (APA) at paragraphs 4-8, the Applicant notes that it was known to use sidefiles "to track writes received and forwarded by the respective storage entity" (paragraph 5) and that "secondary storage entity 30 may transmit an acknowledgment to primary storage entity 20 that the sequence number 1 and its associated write is accounted for at secondary storage entity 30. Upon receipt of this acknowledgment, primary storage entity 20 is at liberty to remove the sequence number 1 from sidefile 50" (paragraph 8).

As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made to track acknowledgements in McBrearty's system to verify that writes forwarded by a given node have in fact been received by the intended node. This ensures that the mirroring devices all remain consistent.

Regarding claims 6, 14, 20, 24, 25, 32, and 34, McBrearty only shows 4 nodes (N-1 through N+2), however it would have been obvious to one of ordinary skill in the art at the time the invention was made to include additional nodes for the additional data protection ability that provides.

Regarding claims 15 and 26, the determination of whether to use synchronous or asynchronous mirroring between any two nodes is an obvious matter of design choice.

Claims 2-5, 7-13, 17-19, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) of the specification in view of U.S. Patent 6,820,180 to McBrearty et al. in view of U.S. Patent 6,795,895 to Merkey et al. and U.S. Patent Application Publication 2005/0010731 to Zalewski et al.

McBrearty does not disclose the claimed node-shunting links (NSL).

However, Merkey shows cascaded mirror RAID groups in Fig. 13 and discusses them at column 11, lines 44-67. He discloses a cascaded mirror RAID group that can handle the failure of a mirror.

Zalewski teaches at paragraph 15 that “strategies for resolving the effects of physical disruptions call for following established industry practices, such as setting up several layers of mirrors and the use of failover system technologies.”

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the claimed node-shunting links in McBrearty's device because this would enhance the ability of his device to continue after the inevitable failure of a mirror storage device. Using node-shunting links as “failover system

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technologies” to bypass the failed mirror would have been obvious as a way of “resolving the effects of physical disruptions” as taught by Zalewski.

Conclusion

Any inquiry concerning this Office action should be directed to the Examiner by phone at (571) 272-4214.

Any response to this Office action should be labeled appropriately (including serial number, Art Unit 2189, and type of response) and mailed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, hand-carried or delivered to the Customer Service Window at the Randolph Building, 401 Dulany Street, Alexandria, VA 22313, or faxed to (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197.

A handwritten signature in black ink, appearing to read "Kevin Verbrugge", with a stylized, cursive script.

Kevin Verbrugge
Primary Examiner
Art Unit 2189